ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
CJSSR

CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW

Vol.04 No.02 (2026)

ARTIFICIAL INTELLIGENCE IN SOCIAL SCIENCE RESEARCH: MAPPING ITS EXTENT, OPPORTUNITIES, AND CONSTRAINTS IN HIGHER EDUCATION CONTEXTS

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ABSTRACT

The rapid advancement of Artificial Intelligence (AI) has significantly transformed research practices across disciplines, including the social sciences. In higher education contexts, AI tools are increasingly being utilized to support literature review, data analysis, and academic writing. However, the extent of their use, along with associated opportunities and constraints, remains underexplored—particularly within university classrooms. This study aimed to map the extent to which AI is integrated into social science research practices and to examine its perceived benefits and limitations among university students. The study was guided by the following objectives; (1) to assess the extent of AI utilization in social science research at the university level; (2) to identify the perceived opportunities of AI in enhancing research efficiency and quality; (3) to examine the constraints and challenges associated with AI use in academic research; (4) to analyze differences in AI usage based on demographic variables (e.g., gender, level of study).A quantitative descriptive survey design was employed. The sample consisted of N = 240 university students enrolled in social science disciplines (Education, Sociology, Psychology) selected through stratified random sampling. Data were collected using a structured questionnaire comprising three subscales: AI Usage (10 items), Opportunities (8 items), and Constraints (8 items), measured on a 5-point Likert scale. The instrument demonstrated acceptable reliability (Cronbach's α = 0.87). Data were analyzed using descriptive statistics (mean, standard deviation, percentages) and inferential statistics, including independent samples t-test and one-way ANOVA. Correlation analysis (Pearson r) was also conducted to examine relationships among variables. The results indicated a moderate to high level of AI usage in social science research (M = 3.68, SD = 0.74). Perceived opportunities were significantly high (M = 4.02, SD = 0.65), highlighting AI's role in improving research efficiency and data analysis capabilities. However, constraints were also notable (M = 3.51, SD = 0.71), particularly concerning over-reliance and ethical concerns. A significant positive correlation was found between AI usage and perceived opportunities (r = 0.62, p < .01), while a moderate correlation existed between AI usage and constraints (r = 0.41, p < .05). Gender differences were insignificant (t = 1.12, p > .05), whereas level of study showed significant differences (F = 4.36, p < .05), with postgraduate students reporting higher AI usage. The findings suggest that AI is becoming an integral tool in social science research, enhancing productivity and access to information. However, concerns regarding academic integrity, critical thinking decline, and ethical usage persist. The coexistence of high opportunities and notable constraints reflects a transitional phase in AI adoption within higher education. AI holds substantial potential to transform social science research in university settings. While its integration is evident and beneficial, it requires structured guidance to mitigate associated risks and ensure responsible use.

It is recommended that universities develop AI usage guidelines, integrate AI literacy programs into curricula, and promote ethical research practices. Additionally, faculty training should be conducted to effectively incorporate AI tools into teaching and research supervision.

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
Vol.04 No.02 (2026)

Keywords: *Artificial Intelligence, Social Science Research, Higher Education, Research Practices, AI Integration*

INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force in contemporary research ecosystems, reshaping how knowledge is generated, analyzed, and disseminated across disciplines. In the field of social sciences, AI-driven tools—ranging from machine learning algorithms to natural language processing applications—are increasingly being integrated into academic workflows, particularly within higher education environments. These technologies facilitate complex data analysis, automate literature synthesis, and enhance academic writing processes, thereby redefining traditional research paradigms (Zawacki-Richter et al., 2019; updated perspectives in Holmes et al., 2022).

In recent years, the proliferation of generative AI platforms such as advanced language models has further accelerated the adoption of AI in university-level research. These tools enable students and researchers to perform tasks more efficiently, including data coding, thematic analysis, and predictive modeling, which were previously time-intensive (Dwivedi et al., 2023). Consequently, AI has not only expanded the methodological toolkit available to social science researchers but has also contributed to improving the overall quality and speed of research outputs (Kasneci et al., 2023).

Despite these advancements, the extent to which AI is systematically utilized in social science research within higher education remains uneven and insufficiently documented. While some students actively engage with AI tools to enhance productivity, others demonstrate limited adoption due to lack of awareness, technical skills, or institutional support (Crompton & Burke, 2023). This disparity highlights the need to empirically assess the level of AI integration across different academic contexts and student demographics.

Moreover, AI presents significant opportunities for improving research efficiency and innovation. It enables rapid data processing, supports evidence-based decision-making, and fosters interdisciplinary collaboration (Bond et al., 2024). In addition, AI can assist in minimizing human bias in data interpretation and enhance the rigor of analytical procedures. However, alongside these benefits, several constraints and challenges persist. Ethical concerns related to academic integrity, data privacy, algorithmic bias, and over-reliance on automated systems have raised critical questions about the responsible use of AI in academic research (UNESCO, 2021; Gillani et al., 2023).

Another critical dimension involves the influence of demographic variables—such as gender, academic level, and digital literacy—on AI adoption patterns. Emerging studies suggest that differences in access, confidence, and prior exposure to technology may significantly shape how students utilize AI tools in their research activities (Chiu, 2024). Understanding these variations is essential for developing inclusive and effective policies that promote equitable AI integration in higher education.

Given these considerations, the present study aims to map the extent of AI utilization in social science research within university settings, while also examining the perceived opportunities and constraints associated with its use. Furthermore, it seeks to explore demographic differences in AI adoption, thereby providing a comprehensive understanding of how AI is shaping research practices in higher education contexts.

LITERATURE REVIEW

The integration of Artificial Intelligence (AI) into higher education has gained substantial scholarly attention in recent years, particularly in the context of teaching, learning, and research practices. Within the social sciences, AI is increasingly recognized as a transformative tool that enhances research capabilities through automation, predictive

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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analytics, and advanced data processing. Contemporary literature indicates that AI adoption is not only reshaping methodological approaches but also redefining the epistemological foundations of research in higher education contexts (Selwyn, 2022).

Extent of AI Utilization in Social Science Research

Recent studies suggest a growing adoption of AI tools among university students and researchers, particularly for literature review, qualitative coding, and statistical analysis. For instance, Luo (2023) found that AI-based tools significantly reduce the time required for systematic reviews by automating article screening and data extraction processes. Similarly, Ouyang et al. (2022) reported that machine learning applications are increasingly being used to analyze large-scale social datasets, enabling researchers to uncover patterns that were previously difficult to detect.

However, the extent of AI utilization remains uneven across institutions and disciplines. While technologically advanced universities demonstrate higher levels of integration, many developing contexts still face infrastructural and skill-related barriers (Ng et al., 2023). This variation underscores the importance of examining AI adoption within specific higher education environments, particularly in the social sciences where traditional research approaches are still dominant.

Opportunities of AI in Enhancing Research Efficiency and Quality

The literature consistently highlights several opportunities associated with AI integration in academic research. One of the most significant advantages is the enhancement of research efficiency. AI tools can process large volumes of data rapidly, thereby reducing human workload and increasing productivity (Zhai et al., 2023). Additionally, AI facilitates improved accuracy in data analysis by minimizing human error and bias, particularly in quantitative research.

Another key opportunity lies in the enhancement of research quality. AI-powered writing assistants and analytical tools support researchers in generating coherent arguments, identifying relevant literature, and ensuring methodological rigor (Khalil & Er, 2023). Furthermore, AI promotes interdisciplinary research by enabling the integration of diverse datasets and analytical frameworks, which is particularly beneficial in the social sciences where complex social phenomena require multifaceted analysis (Holmes & Tuomi, 2022).

Constraints and Challenges of AI in Academic Research

Despite its advantages, the use of AI in academic research is accompanied by several challenges. Ethical concerns remain at the forefront of scholarly debates, particularly regarding academic integrity, authorship, and plagiarism. The use of generative AI tools raises questions about originality and the authenticity of student work (Perkins, 2023). Additionally, issues related to data privacy and algorithmic bias pose significant risks, as AI systems may inadvertently reinforce existing social inequalities (Kizilcec & Lee, 2022).

Technical and institutional barriers also limit the effective adoption of AI. Many students lack the necessary digital literacy skills to utilize AI tools effectively, while universities often do not provide adequate training or policy guidance (Lim et al., 2023). Furthermore, over-reliance on AI may lead to a decline in critical thinking and independent research skills, which are essential components of social science inquiry (Selwyn et al., 2023).

Demographic Differences in AI Adoption

Emerging research indicates that AI adoption varies significantly based on demographic factors such as gender, academic level, and technological proficiency. For example, Chiu and Chai (2023) found that postgraduate students are more likely to use AI tools compared to undergraduate students due to their greater research experience and exposure to advanced methodologies. Gender differences have also been observed, with some studies

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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suggesting that male students tend to exhibit higher confidence in using AI technologies, although this gap is gradually narrowing (Ouyang & Jiao, 2021).

Digital literacy and prior exposure to technology further influence AI usage patterns. Students with higher levels of technological competence are more likely to adopt AI tools effectively, while those with limited skills may experience anxiety or resistance (Ng et al., 2023). These findings highlight the need for inclusive strategies that address disparities in AI access and usage within higher education.

Synthesis and Research Gap

While the existing body of literature provides valuable insights into the role of AI in higher education, several gaps remain. Most studies focus on developed countries, with limited empirical evidence from developing contexts such as Pakistan. Additionally, there is a lack of comprehensive research that simultaneously examines the extent, opportunities, and constraints of AI use within a single framework. Moreover, demographic variations in AI adoption are often treated in isolation rather than as part of an integrated analysis.

Therefore, this study seeks to address these gaps by providing a holistic examination of AI utilization in social science research within higher education, with particular emphasis on student perceptions, opportunities, constraints, and demographic differences.

Conceptual Framework

This study is grounded in the premise that the integration of Artificial Intelligence (AI) in social science research is influenced by a combination of enabling factors (opportunities) and inhibiting factors (constraints), while also varying across demographic characteristics of students. The framework conceptualizes AI utilization as a central outcome shaped by multiple interrelated variables within higher education contexts.

At the core of the framework is AI Utilization in Social Science Research, which represents the extent to which university students employ AI tools for academic purposes such as literature review, data analysis, and research writing. This dependent variable is influenced by two major constructs: Perceived Opportunities and Perceived Constraints.

Perceived Opportunities refer to the advantages associated with AI use, including enhanced research efficiency, improved data analysis capabilities, increased accuracy, time-saving, and support for academic writing. These factors are expected to have a positive influence on AI utilization, as students who recognize the benefits of AI are more likely to adopt and integrate such tools into their research practices.

In contrast, Perceived Constraints encompass the challenges and barriers related to AI usage, such as ethical concerns (e.g., plagiarism, academic integrity), lack of digital literacy, limited institutional support, data privacy issues, and over-reliance on automated systems. These constraints are hypothesized to have a negative influence on AI utilization, potentially limiting students' engagement with AI technologies.

Additionally, the framework incorporates Demographic Variables—including gender and level of study (e.g., undergraduate, MS, PhD)—as moderating factors. These variables are expected to influence both the extent of AI utilization and the relationship between opportunities/constraints and AI adoption. For example, postgraduate students may demonstrate higher usage due to greater research exposure, while differences in digital competence may vary across gender groups.

Graphical Representation

Perceived Opportunities (+)

ISSN E: 3006-1466
ISSN P: 3006-1458
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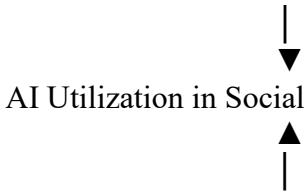

Demographic Variables (Gender, Level of Study)
→ Influence AI Utilization
→ Moderate relationships

Hypothesized Relationships

1. H1: Perceived opportunities have a significant positive effect on AI utilization.
2. H2: Perceived constraints have a significant negative effect on AI utilization.
3. H3: There are significant differences in AI utilization based on demographic variables.
4. H4: Demographic variables moderate the relationship between opportunities, constraints, and AI utilization.

Theoretical Underpinning

This framework is supported by:

1. Technology Acceptance Model (TAM) – explaining how perceived usefulness and ease of use influence adoption.
2. Unified Theory of Acceptance and Use of Technology (UTAUT) – highlighting the role of social and demographic factors.
3. Diffusion of Innovation Theory (Rogers) – explaining how new technologies spread across users over time.

METHODOLOGY

This study employed a quantitative descriptive survey research design to examine the extent of Artificial Intelligence (AI) utilization in social science research within higher education contexts, along with associated opportunities, constraints, and demographic variations.

Population and Sample

The target population comprised university students enrolled in social science disciplines, including Education, Sociology, and Psychology. A total sample of N = 240 students was selected using a stratified random sampling technique to ensure proportional representation across disciplines and academic levels (undergraduate and postgraduate). This approach enhanced the generalizability and representativeness of the findings.

Research Instrument

Data were collected through a structured questionnaire developed on the basis of relevant literature and research objectives. The instrument consisted of three subscales:

1. AI Usage Scale (10 items): measuring the extent of AI integration in academic research activities such as literature review, data analysis, and academic writing.
2. Perceived Opportunities Scale (8 items): assessing perceived benefits of AI, including efficiency, accuracy, and research facilitation.
3. Perceived Constraints Scale (8 items): evaluating challenges such as ethical concerns, lack of skills, and institutional limitations.

All items were rated on a 5-point Likert scale ranging from *1 = Strongly Disagree* to *5 = Strongly Agree*. The overall reliability of the instrument was confirmed using Cronbach's Alpha ($\alpha = 0.87$), indicating satisfactory internal consistency.

Data Collection Procedure

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The questionnaire was administered both physically and electronically to ensure wider accessibility and response rate. Participation was voluntary, and confidentiality of respondents was strictly maintained throughout the research process.

Statistical Analysis

The collected data were analyzed using SPSS software. The following statistical techniques were applied:

1. Descriptive Statistics (mean, standard deviation, and percentages) to summarize AI usage patterns and perceptions of opportunities and constraints.
2. Independent Samples t-test to examine differences in AI utilization across gender groups.
3. One-way ANOVA to analyze differences based on academic level (undergraduate, MS, PhD).
4. Pearson Product-Moment Correlation (r) to determine relationships among AI usage, perceived opportunities, and constraints.

A significance level of $p < 0.05$ was used for all inferential tests.

RESULTS AND FINDINGS

The data were analyzed using descriptive and inferential statistics to examine AI utilization, perceived opportunities, constraints, and group differences among university students.

1. Descriptive Statistics

The descriptive results indicate a moderate to high level of AI usage among social science students ($M = 3.68$, $SD = 0.74$). Perceived opportunities were relatively high ($M = 4.02$, $SD = 0.65$), suggesting that students strongly recognize the benefits of AI in enhancing research efficiency and analytical capabilities. Perceived constraints were also present at a moderate level ($M = 3.51$, $SD = 0.71$), indicating concerns regarding ethical issues and over-reliance on AI tools.

Table 1: Descriptive Statistics

Variable	N	Mean	SD	Interpretation
AI Usage	240	3.68	0.74	Moderate to High
Perceived Opportunities	240	4.02	0.65	High
Perceived Constraints	240	3.51	0.71	Moderate

2. Correlation Analysis

Pearson correlation analysis revealed a significant positive relationship between AI usage and perceived opportunities ($r = 0.62$, $p < .01$), indicating that students who recognize more benefits of AI tend to use it more frequently. A moderate positive correlation was also observed between AI usage and perceived constraints ($r = 0.41$, $p < .05$), suggesting that even students facing challenges continue to engage with AI tools.

Table 2: Correlation Matrix

Variables	AI Usage	Opportunities	Constraints
AI Usage	1	0.62	0.41
Opportunities	0.62	1	0.28
Constraints	0.41	0.28	1

Note: $p < .05$, $p < .01$

3. Independent Samples t-test (Gender Differences)

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The independent samples t-test showed no significant difference in AI usage between male and female students ($t = 1.12$, $p > .05$), indicating that gender does not play a significant role in determining AI adoption in social science research.

Table 3: Gender Differences in AI Usage

Gender	N	Mean	SD	t-value	p-value	Result
Male	118	3.72	0.70			
Female	122	3.64	0.78	1.12	> .05	Not Significant

4. One-Way ANOVA (Level of Study Differences)

The one-way ANOVA revealed a significant difference in AI usage across academic levels ($F = 4.36$, $p < .05$). Postgraduate (MS/PhD) students demonstrated higher AI usage compared to undergraduate students, likely due to greater research exposure and methodological experience.

Table 4: ANOVA Results (Level of Study and AI Usage)

Source	SS	df	MS	F	p-value
Between Groups	18.42	2	9.21	4.36	< .05
Within Groups	498.60	237	2.10		
Total	517.02	239			

Summary of Findings

1. AI usage among students is moderate to high.
2. Perceived opportunities are strong and positively associated with AI usage.
3. Constraints exist but do not significantly hinder AI adoption.
4. No gender differences were observed in AI usage.
5. Significant differences by academic level indicate higher adoption among postgraduate students.
6. Opportunities strongly predict AI usage, while constraints show a weaker but significant relationship.

DISCUSSION

The present study examined the extent of Artificial Intelligence (AI) utilization in social science research within higher education, along with perceived opportunities, constraints, and demographic differences. The findings provide meaningful insights into how AI is reshaping research practices among university students, particularly in developing academic contexts.

Extent of AI Utilization

The results indicated a moderate to high level of AI usage ($M = 3.68$) among social science students, suggesting that AI tools are increasingly being integrated into academic research activities. This finding aligns with recent evidence that AI is becoming a routine component of higher education research workflows, especially for tasks such as literature review, data organization, and academic writing support (Kasneci et al., 2023; Zhai et al., 2023). However, the moderate rather than high level of adoption also reflects that AI integration is still in a transitional phase, particularly in contexts where institutional support and training remain limited.

Perceived Opportunities of AI

The significantly high mean score for perceived opportunities ($M = 4.02$) highlights that students strongly recognize the value of AI in enhancing research efficiency, accuracy, and analytical capability. This supports the growing body of literature that positions AI as a productivity-enhancing tool in academic environments (Dwivedi et al., 2023). The strong positive correlation between AI usage and perceived opportunities ($r = 0.62$, $p < .01$) further

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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confirms that perceived usefulness plays a central role in adoption behavior, consistent with the **Technology Acceptance Model (TAM).**

These findings suggest that when students perceive AI as beneficial for simplifying complex research tasks, their likelihood of adoption increases significantly. AI tools are thus functioning not only as technological aids but also as cognitive extensions that support research decision-making processes.

Perceived Constraints and Ethical Concerns

Although AI usage and perceived opportunities were high, the presence of moderate constraints (M = 3.51) indicates that several challenges persist. These include ethical concerns, over-reliance on automated systems, and uncertainty regarding academic integrity. This aligns with prior studies emphasizing that generative AI introduces complex ethical dilemmas in academic writing and authorship attribution (Perkins, 2023; Gillani et al., 2023).

Interestingly, the positive correlation between AI usage and constraints ($r = 0.41$, $p < .05$) suggests that students continue to use AI despite being aware of its limitations. This may reflect a pragmatic approach where the benefits of AI outweigh perceived risks, or it may indicate insufficient institutional regulation and guidance regarding responsible AI use in academic research.

Demographic Differences

The findings revealed no significant gender differences ($t = 1.12$, $p > .05$) in AI usage, indicating that both male and female students engage with AI tools at comparable levels. This result is consistent with recent research suggesting that gender gaps in digital technology adoption are narrowing in higher education contexts (Chiu, 2024).

However, a significant difference based on academic level ($F = 4.36$, $p < .05$) was observed, with postgraduate students demonstrating higher AI usage than undergraduates. This can be attributed to greater research exposure, advanced methodological training, and increased necessity for data-intensive research at higher academic levels. These findings are consistent with Ouyang et al. (2022), who argue that research maturity significantly influences the adoption of advanced analytical technologies.

Theoretical Implications

The results strongly support the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), particularly in relation to perceived usefulness and behavioral intention. The strong influence of perceived opportunities confirms that usefulness is a primary driver of AI adoption. Additionally, demographic differences reinforce the role of experience and academic maturity as facilitating conditions in technology adoption frameworks.

Contextual Interpretation

In developing higher education contexts, such as Pakistan, AI adoption in social science research appears to be growing but remains uneven. Limited institutional training, lack of formal AI integration policies, and ethical ambiguity may explain the moderate level of adoption despite high awareness of benefits. This suggests a gap between technological potential and practical implementation in academic settings.

Summary of Discussion

Overall, the study demonstrates that AI is increasingly recognized as a valuable research support tool in social sciences, particularly due to its efficiency and analytical advantages. However, ethical concerns and structural constraints continue to shape its adoption. While demographic factors such as gender show no influence, academic level significantly affects usage patterns, indicating that research experience plays a critical role in AI integration.

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ISSN P: 3006-1458
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CONCLUSION AND RECOMMENDATIONS

Conclusion

This study investigated the extent of Artificial Intelligence (AI) utilization in social science research within higher education contexts, along with perceived opportunities, constraints, and demographic differences among university students. The findings reveal that AI usage among students is moderate to high, indicating a growing integration of AI tools in academic research practices.

Students strongly recognize the benefits of AI, particularly in enhancing research efficiency, data analysis, and academic writing support. The significant positive relationship between perceived opportunities and AI usage confirms that perceived usefulness is a key driver of AI adoption in higher education research environments.

However, the study also highlights the presence of moderate constraints, including ethical concerns, risk of over-reliance, and challenges related to academic integrity. Despite these limitations, students continue to engage with AI tools, suggesting a pragmatic acceptance of technology in research practices.

Demographically, the findings show no significant gender differences, indicating equitable adoption across male and female students. In contrast, significant differences based on academic level were observed, with postgraduate students demonstrating higher levels of AI usage due to greater research exposure and methodological competence.

Overall, the study concludes that AI is becoming an increasingly important component of social science research in higher education; however, its integration remains partially structured and requires institutional support to ensure ethical and effective use.

Recommendations

Based on the findings, the following recommendations are proposed:

1. Institutional Integration of AI Training

Universities should incorporate structured AI literacy and training programs within social science curricula. These programs should focus on practical applications of AI tools in research, including literature review, data analysis, and academic writing.

2. Development of Ethical Guidelines

Higher education institutions should establish clear ethical frameworks and policies governing the use of AI in academic research. These guidelines should address issues such as plagiarism, authorship, data privacy, and responsible use of generative AI tools.

3. Capacity Building for Students

Workshops, seminars, and hands-on training sessions should be organized to enhance students' digital competence and research skills. Special attention should be given to undergraduate students who demonstrate comparatively lower levels of AI utilization.

4. Equitable Access to AI Tools

Universities should ensure equal access to AI-based research tools across all disciplines and academic levels. Providing institutional subscriptions to AI platforms can help reduce disparities in usage.

5. Promotion of Critical AI Use

Students should be encouraged to use AI as a supportive research assistant rather than a replacement for critical thinking. Academic programs should emphasize analytical reasoning and interpretation skills alongside technological proficiency.

6. Further Research Directions

Future research should explore longitudinal impacts of AI adoption on research quality and academic performance. Comparative studies across different countries and disciplines are also recommended to gain a broader understanding of AI integration in higher education.

ISSN E: 3006-1466
ISSN P: 3006-1458
CONTEMPORARY JOURNAL OF SOCIAL SCIENCE REVIEW
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ISSN P: 3006-1458
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